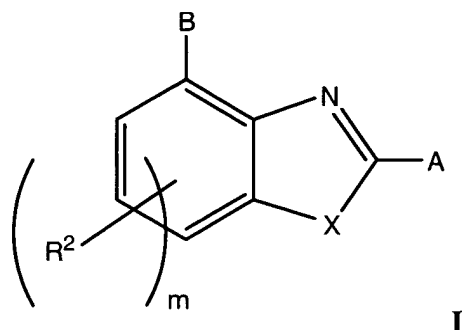


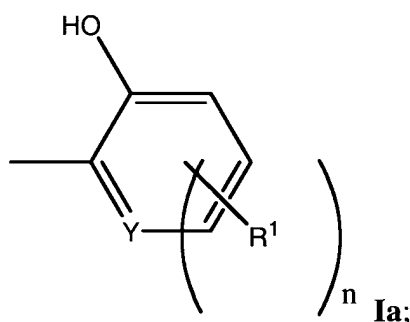
WHAT IS CLAIMED IS:

1. A chemical compound of general structure I:



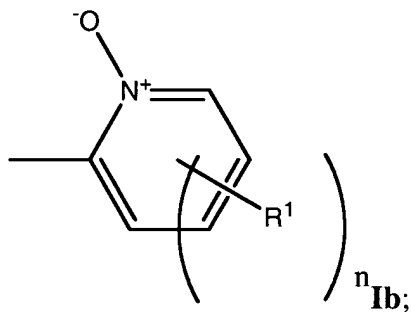
- 5 wherein A is a cyclic ring;
 wherein B comprises a metal binding substituent;
 wherein each R² is independently hydrogen, halogen, alkyl, cyano, alkoxy, carboalkoxy, haloalkyl, or alkylamino;
 wherein m is 1 to 3; and
- 10 wherein X is NR³, O, or S, wherein R³ is hydrogen, alkyl, halo, haloalkyl, alkoxy, CO₂R⁵, COR⁵, or aryl, and wherein R⁵ is hydrogen, alkyl, amino acid, or peptide.

2. The compound of claim 1, wherein A is a structure of the form **Ia**:



- 15 wherein Y is CH, CR¹, or N;
 wherein n is 1 to 3; and
 wherein each R¹ is independently H, alkyl, halo, haloalkyl, alkoxy, arylalkyl, or alkylamino, and wherein R¹ is positioned on any carbon ortho, meta, or para to the -OH group.

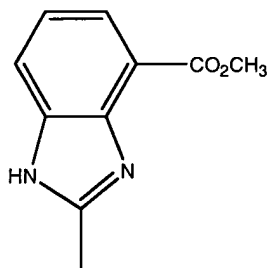
3. The compound of claim 1, wherein A is a structure of the form **Ib**:



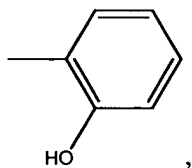
wherein n is 1 to 4; and

- 5 wherein each R¹ is independently H, alkyl, halo, haloalkyl, alkoxy, or alkylamino.

4. The compound of claim 1, wherein B is

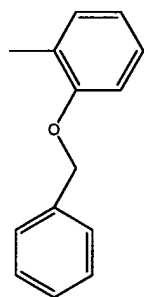


- 10 wherein A is



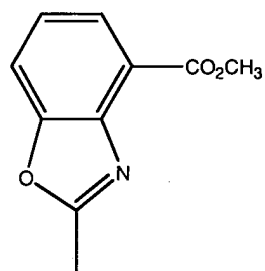
and wherein X is oxygen.

- 15 5. The compound of claim 1, wherein B is CO₂H, wherein A is

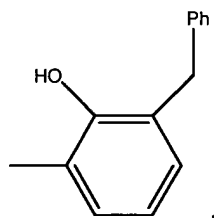


and wherein X is NH.

- 5 6. The compound of claim 1, wherein B is



wherein A is



10

and wherein X is oxygen.

7. The compound of claim 1, wherein B is CO_2CH_3 , wherein A is $\text{C}_6\text{H}_5\text{OH}$, and wherein X is oxygen.

15

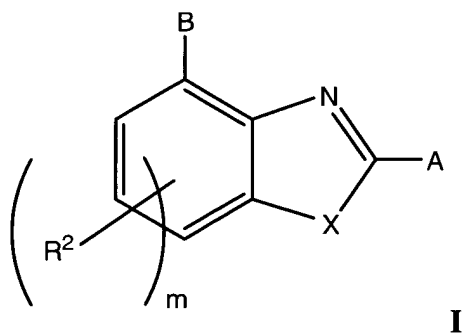
8. The compound of claim 1, wherein the metal binding substituent is configurable to bind magnesium.

9. The compound of claim 1, wherein the metal binding substituent is configurable to bind to at least one of nickel, calcium, zinc, or iron.

5 10. The compound of claim 1, wherein the metal binding substituent is configurable to bind a metal ion and to allow association of the resulting complex with double-stranded DNA.

11. The compound of claim 1, wherein the metal binding substituent is configurable to bind a metal ion and to allow the resulting complex to cleave DNA in the presence of an oxidant.

12. A method of treating cancerous cell(s) with a chemical composition comprising a chemical compound, comprising administering the chemical composition to a subject; wherein the chemical compound has general structure I:



wherein A is a cyclic ring;

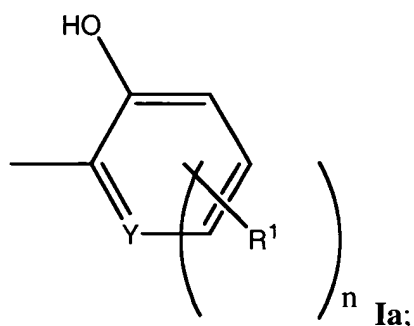
wherein B comprises a metal binding substituent;

wherein each R^2 is independently hydrogen, halogen, alkyl, cyano, alkoxy, carboalkoxy, haloalkyl, or alkylamino;

wherein m is 1 to 3; and

wherein X is NR^3 , O, or S, wherein R^3 is hydrogen, alkyl, halo, haloalkyl, alkoxy, CO_2R^5 , COR^5 , or aryl, and wherein R^5 is hydrogen, alkyl, amino acid, or peptide.

13. The method of claim 12, wherein A is a structure of the form **Ia**:

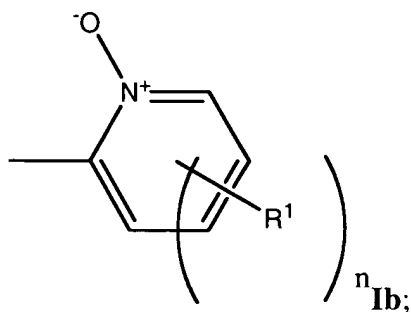


wherein Y is CH, CR¹, or N;

wherein *n* is 1 to 3; and

- 5 wherein each R¹ is independently H, alkyl, halo, haloalkyl, alkoxy, arylalkyl, or alkylamino, and wherein R¹ is positioned on any carbon ortho, meta, or para to the -OH group.

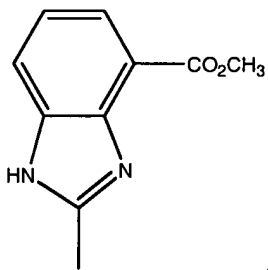
14. The method of claim 12, wherein A is a structure of the form **Ib**:



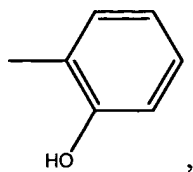
wherein *n* is 1 to 4; and

wherein each R¹ is independently H, alkyl, halo, haloalkyl, alkoxy, or alkylamino.

15. The method of claim 12, wherein B is

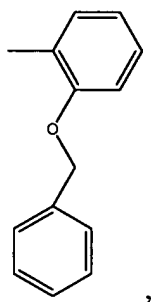


wherein A is



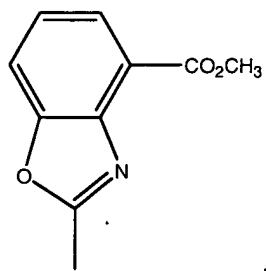
5 and wherein X is oxygen.

16. The method of claim 12, wherein B is CO₂H, wherein A is

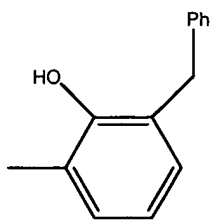


10 and wherein X is NH.

17. The method of claim 12, wherein B is



15 wherein A is



and wherein X is oxygen.

- 5 18. The method of claim 12, wherein B is CO_2CH_3 , wherein A is $\text{C}_6\text{H}_5\text{OH}$, and wherein X is oxygen.

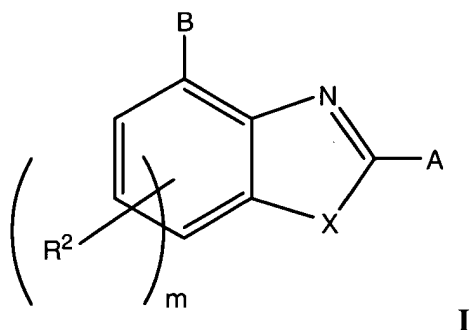
19. The method of claim 12, wherein the metal binding substituent is configurable to bind magnesium.

10

20. The method of claim 12, wherein the metal binding substituent is configurable to bind to at least one of nickel, calcium, zinc, or iron.

21. A method of treating cancerous cell(s) with a chemical composition comprising a
15 metal and a chemical compound, comprising administering the chemical composition to a subject;

wherein the chemical compound has general structure I:



I

wherein A is a cyclic ring;

- 20 wherein B comprises a metal binding substituent;

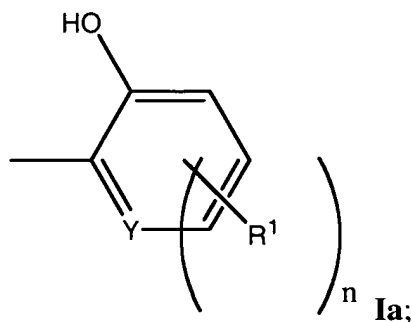
wherein each R^2 is independently hydrogen, halogen, alkyl, cyano, alkoxy, carboalkoxy, haloalkyl, or alkylamino;

wherein m is 1 to 3; and

wherein X is NR^3 , O, or S, wherein R^3 is hydrogen, alkyl, halo, haloalkyl, alkoxy, CO_2R^5 ,

5 COR^5 , or aryl, and wherein R^5 is hydrogen, alkyl, amino acid, or peptide.

22. The method of claim 21, wherein A is a structure of the form **Ia**:

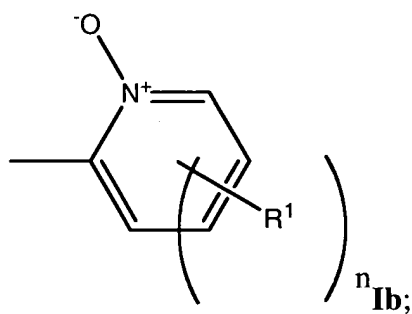


wherein Y is CH, CR^1 , or N;

10 wherein n is 1 to 3; and

wherein each R^1 is independently H, alkyl, halo, haloalkyl, alkoxy, arylalkyl, or alkylamino, and wherein R^1 is positioned on any carbon ortho, meta, or para to the -OH group.

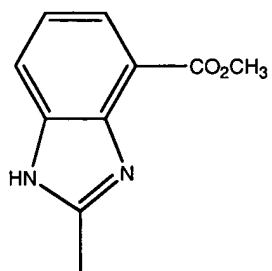
15 23. The method of claim 21, wherein A is a structure of the form **Ib**:



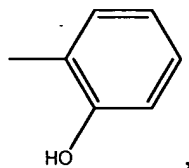
wherein n is 1 to 4; and

wherein each R^1 is independently H, alkyl, halo, haloalkyl, alkoxy, or alkylamino.

24. The method of claim 21, wherein B is

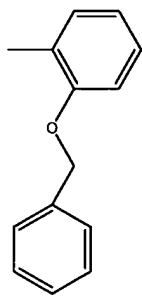


wherein A is



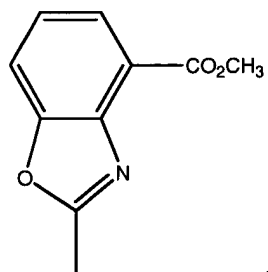
and wherein X is oxygen.

25. The method of claim 21, wherein B is CO_2H , wherein A is

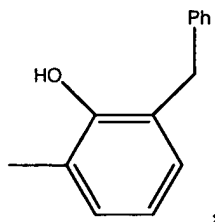


and wherein X is NH.

26. The method of claim 21, wherein B is



wherein A is



5

and wherein X is oxygen.

27. The method of claim 21, wherein B is CO_2CH_3 , wherein A is $\text{C}_6\text{H}_5\text{OH}$, and wherein X is oxygen.

10

28. The method of claim 21, wherein the metal binding substituent is configurable to bind magnesium.

29. The method of claim 21, wherein the metal binding substituent is configurable to bind to at least one of nickel, calcium, zinc, or iron.

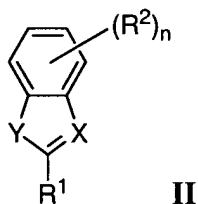
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30. The method of claim 21, wherein the metal is at least one of nickel, calcium, zinc, or iron.

31. The method of claim 21, wherein the metal is magnesium.

20

32. A method of synthesizing a chemical compound comprising a cyclic ring having the structure **II**

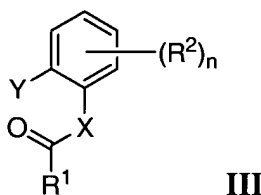


5 where R¹ and R² are independently hydrogen, alkyl, aryl, or halogen;

where n is 1 to 4; and

where X and Y are independently N or O, comprising:

reacting an acyclic compound having the structure **III** with an acid in a solvent;



10

where R¹ and R² are independently hydrogen, alkyl, aryl, or halogen;

where n is 1 to 4; and

where X and Y are independently N or O;

heating the reaction.

15

33. The method of claim 32, wherein the acid is an organic acid.

34. The method of claim 32, wherein the acid is *p*-TsOH.

20 35. The method of claim 32, wherein the solvent is an organic solvent.

36. The method of claim 32, wherein the solvent is a hydrocarbon.

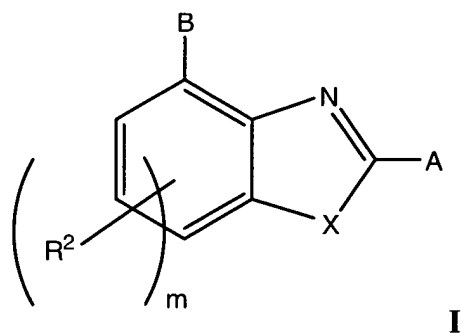
37. The method of claim 32, wherein heating the reaction comprises a temperature above 80°C.

38. The method of claim 32, further comprising cooling the reaction down to at least
5 room temperature and filtering off the acid.

39. A method of selecting a cytotoxic compound comprising:
determining the amount of binding of a benzoxazole compound to double-
stranded DNA in the absence of any metal ions;
10 determining the amount of binding of a benzoxazole compound to double-
stranded DNA in the presence of a metal ion; and
selecting one or more benzoxazole compounds that show greater binding in the
presence of the metal ion then the amount of binding of the selected benzoxazole
compounds in the absence of the metal ion.

15

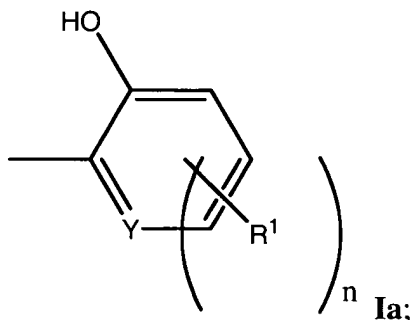
40. The method of claim 39, wherein the wherein the benzoxazole compounds have
the general structure I:



wherein A is a cyclic ring;
20 wherein B comprises a metal binding substituent;
wherein each R² is independently hydrogen, halogen, alkyl, cyano, alkoxy,
carboalkoxy, haloalkyl, or alkylamino;
wherein m is 1 to 3; and

wherein X is NR^3 , O, or S, wherein R^3 is hydrogen, alkyl, halo, haloalkyl, alkoxy, CO_2R^5 , COR^5 , or aryl, and wherein R^5 is hydrogen, alkyl, amino acid, or peptide.

41. The method of claim 40, wherein A is a structure of the form **Ia**:

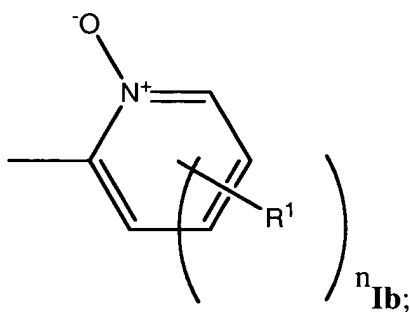


wherein Y is CH, CR^1 , or N;

wherein n is 1 to 3; and

wherein each R^1 is independently H, alkyl, halo, haloalkyl, alkoxy, arylalkyl, or alkylamino, and wherein R^1 is positioned on any carbon ortho, meta, or para to the -OH group.

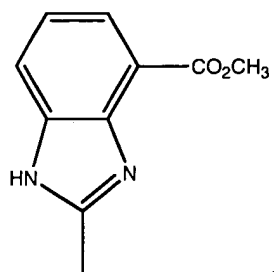
42. The method of claim 40, wherein A is a structure of the form **Ib**:



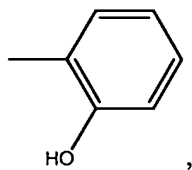
wherein n is 1 to 4; and

wherein each R^1 is independently H, alkyl, halo, haloalkyl, alkoxy, or alkylamino.

43. The method of claim 40, wherein B is



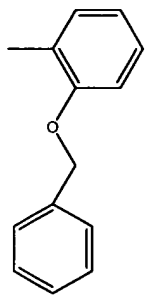
wherein A is



5

and wherein X is oxygen.

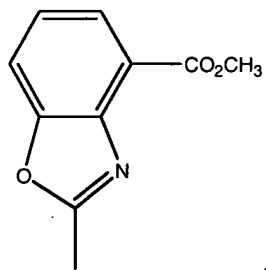
44. The method of claim 40, wherein B is CO₂H, wherein A is



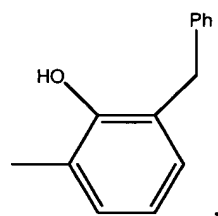
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and wherein X is NH.

45. The method of claim 40, wherein B is



wherein A is



5 and wherein X is oxygen.

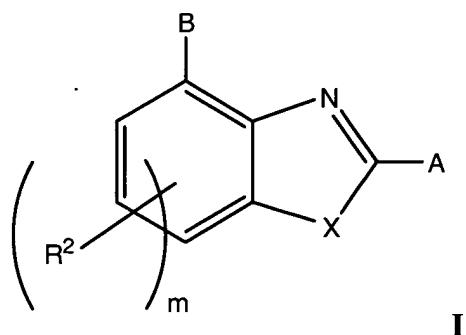
46. The method of claim 40, wherein B is CO_2CH_3 , wherein A is $\text{C}_6\text{H}_5\text{OH}$, and wherein X is oxygen.

10 47. The method of claim 40, wherein the metal ion is magnesium.

48. The method of claim 40, wherein the metal ion is divalent manganese, nickel, copper, cobalt or zinc.

15 49. A method of selecting an antimicrobial compound comprising:
determining the amount of binding of a benzoxazole compound to double-stranded DNA in the absence of any metal ions;
determining the amount of binding of a benzoxazole compound to double-stranded DNA in the presence of a metal ion; and
20 selecting one or more benzoxazole compounds that show substantially similar binding in the presence of the metal ion then the amount of binding of the selected benzoxazole compounds in the absence of the metal ion.

50. The method of claim 49, wherein the benzoxazole compounds have
25 the general structure I:



wherein A is a cyclic ring;

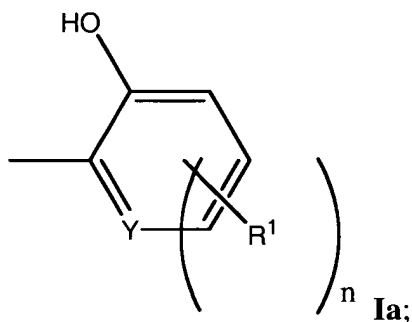
wherein B comprises a metal binding substituent;

wherein each R² is independently hydrogen, halogen, alkyl, cyano, alkoxy,
 5 carboalkoxy, haloalkyl, or alkylamino;

wherein m is 1 to 3; and

wherein X is NR³, O, or S, wherein R³ is hydrogen, alkyl, halo, haloalkyl, alkoxy, CO₂R⁵,
 COR⁵, or aryl, and wherein R⁵ is hydrogen, alkyl, amino acid, or peptide.

10 51. The method of claim 50, wherein A is a structure of the form **Ia**:

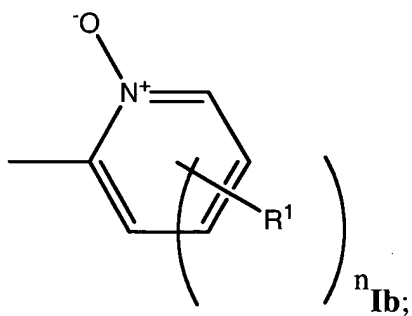


wherein Y is CH, CR¹, or N;

wherein n is 1 to 3; and

wherein each R¹ is independently H, alkyl, halo, haloalkyl, alkoxy, arylalkyl, or
 15 alkylamino, and wherein R¹ is positioned on any carbon ortho, meta, or para to the
 -OH group.

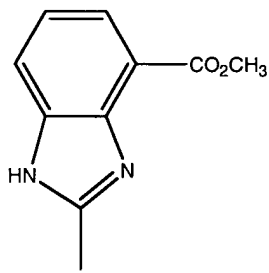
52. The method of claim 50, wherein A is a structure of the form **Ib**:



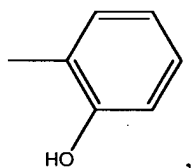
wherein n is 1 to 4; and

wherein each R^1 is independently H, alkyl, halo, haloalkyl, alkoxy, or alkylamino.

- 5 53. The method of claim 50, wherein B is



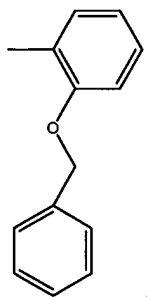
wherein A is



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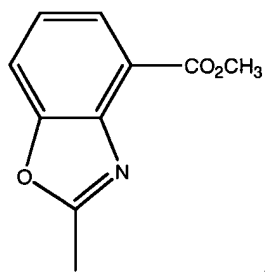
and wherein X is oxygen.

54. The method of claim 50, wherein B is CO_2H , wherein A is

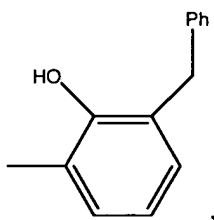


and wherein X is NH.

- 5 55. The method of claim 50, wherein B is



wherein A is



10

and wherein X is oxygen.

56. The method of claim 50, wherein B is CO_2CH_3 , wherein A is $\text{C}_6\text{H}_5\text{OH}$, and wherein X is oxygen.

15

57. The method of claim 50, wherein the metal ion is magnesium.

58. The method of claim 50, wherein the metal ion is divalent manganese, nickel, copper, cobalt or zinc.